

MANUAL FOR DIAGNOSIS AND TREATMENT OF PULMONARY
TUBERCULOSIS

PUBLIC HEALTH AND WELFARE TECHNICAL BULLETIN

PH&W GHQ SCAP APO 500

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1. Foreward

The purpose of this manual is to present certain facts concerning the diagnosis and treatment of tuberculosis. These facts are to be presented as simply as possible. They will also be translated into Japanese so that they will be available also to the Japanese physician. The Military Government medical officers will have a similar copy in English. In this way, both groups will have the same material. With it, they can coordinate their work for the control of tuberculosis in Japan. It is necessary that a brief review of the epidemiology, etiology and particularly, pathology of tuberculosis be made. Behind any diagnosis or plan for treatment, there must be the basic knowledge of these important phases of this disease.

2. Introduction

SCAP has recognized the seriousness of the tuberculosis situation in Japan. The number of cases is increasing in Japan due to the exigencies of war and its effect upon the economy and the health of the people. While accurate statistics for the past three years are not available, it is known that both the mortality and morbidity have definitely increased in that time, and that there are many more ~~deceiv~~ cases of tuberculosis than are reported throughout the country.

Under the direction of PH & W, SCAP, a definite set of policies have been established. These have been planned in five steps. They are already activated at the present time.

First, in an effort to encourage the return to the hospitals of patients with active tuberculosis, a survey of the nutritional status of hospital patients has been made. Sources of food have been found and arrangements for financial aid for medical care of these patients while in the hospital have been established. The Ministry of Public Health and Welfare is responsible for the procurement of this food and money. By these means the active source of infection is removed from the home and the patients are offered the opportunity to find time to permit the arrest of their infection and recovery of their health.

It has been found that marked variation in diagnostic methods and treatment of tuberculosis exists in Japan. In an effort to coordinate these factors, this manual was produced. It will be recommended to the Japanese physician. This is the second step in the program which is already activated.

Together with the two previously discussed steps, the third measure of continued case finding and individual control has been maintained in the health centers. Associated with this part of the program is the establishing of the school lunches which was begun in December 1946. This is a corrective and supplemental feeding and has an educational value in proper dietetics and nutrition. The mass examination of school children by means of X-ray and the Mantoux test is already in progress and is being widely encouraged. It is under the supervision of the Ministry of Health and Welfare. It is through these efforts, based upon case finding, that the positive cases are followed into the home and instruction in methods of control is given there. Through the press, through discussion with various medical and lay groups, information has been and will be given emphasizing the control of tuberculosis in the home and the value of hospital care for all active cases.

This same program, begun with the children of Japan, will be expanded as a fifth step to include various groups of workers throughout the country.

3. Epidemiology

Before the onset of World War II, Japan and Finland had a death rate in tuberculosis of 200 per 100,000 per year. This figure was four times the rate found in Denmark, the Netherlands, Australia, New Zealand and the United States of America (less than 50 per 100,000). England and Wales, Italy, Germany and Sweden had between 50 and 100 per 100,000. The Philippines, Puerto Rico and Chile had over 250 per 100,000 per year. There has been a decline in the United States from 202 per 100,000 in 1900 to less than 40 per 100,000 in 1946. Due to the marked shift in population throughout Japan, and the loss of records of vital statistics due to the exigencies of war later figures for Japan have been unavailable. Thus, recent vital statistics for Japan are not to be quoted. However, it is known that the number of deaths from tuberculosis reported have definitely increased up to 1943 in both the first two years of life and in the adolescent period. An estimate of 200,000 deaths from tuberculosis in this present year in Japan is a startling figure.

Therefore, it is necessary to review the predisposing factors which play a role in the development of tuberculosis and of such a death rate. The scientific minds of Japan face many problems as a result of its rapid national growth. The most important of these is to combat the fatalistic viewpoint and superstition concerning tuberculosis, and to create a realistic, hopeful approach to its control. Other nations have done it, and Japan can also do it through education of its people.

Tuberculosis is not--is not--a hereditary disease nor is there any inherent tendency to this infection. It is purely a communicable disease. It is definitely transmitted from one individual to another. It is true that certain factors do predispose to its occurrence. They are social and economic, and not hereditary factors. The state of nutrition, the presence of fatigue, and the occurrence of other acute infections, which break down the defenses of the body and permit invasion by the tubercular infection all play supportive roles. Various other factors such as over crowding in poor housing and the resultant lack of fresh air and sun light all have a part in its development. Ang ignorance of simple rules which prevent its transmission is the greatest offender of all. With these conditions in mind, it is not difficult to understand the marked rise in the number of deaths from tuberculosis in the first three years of life. It is in these years in which the seed of tuberculosis is sown. It lies dormant throughout childhood only to sprout up again in the adolescent period. It produces the second peak of morbidity and mortality records of this disease. One might almost say tuberculosis is a disease of childhood which produces its effect in adolescence or young adulthood.

4. Etiology

Tuberculosis is caused by the mycobacterium tuberculosis, of which there are four types; the human, bovine, gallinaceous and reptilian. Of these, the first two types are the most common invaders, and in Japan it is the human type in the majority of cases.

5. Pathology

The major route of invasion is by inhalation. There are other lines such as ingestion, through wounds, through the faucial tonsils and by transplacental transmission. The infected breath, cough or sputum of the tuberculous mother or members of the family is a continual menace. The common cup and the common chop stick are excellent transmitters of infection. At no time in life is the individual exposed as in infancy. The infant itself has a greater susceptibility to tuberculosis due to the constant exposure. It has a lesser immunity with which to combat the invasion. Since the infection plays so important a role in childhood, it is at this level that the approach to its control must be made. The pathology of the infection must be thoroughly understood, because all plans for treatment are based solidly on that knowledge. The portal of entry is through the epithelial surfaces. The bacilli pass through the epithelium. Some of the bacilli remain at the port of entry and there establish the primary focus which is a small area of bronchopneumonia. Others of the bacilli are picked up by the wandering cells. In them, the bacilli are carried along in the lymph stream to the lymph nodes which drain the particular area involved. The lymph nodal invasion together with the primary focus compose the primary complex. The histological picture of the tuberculous invasion occurs in the following patterns: First, there is a reaction of the tissues to the presence of the organisms. This produces an accumulation of the polymorphonuclear cells at the site of the invasion. They surround the organisms as a first line of

defense. As a second line, certain epithelioid cells surround the tubercle bacilli to form concentric whorls. These create the typical tubercle formation. These tubercles may be individual or develop in masses. A third line of defense is laid down as the lymphocytic cells and giant cells surround the tubercle. After the tubercle is formed, a degenerative stage develops. The center of the tubercles becomes softened (caseated) and liquifies. This liquified material is absorbed into the lymph stream. Deposition of calcium occurs within the mass of the tubercle. Just before calcification occurs is the time of the greatest clinical danger. At this stage, three processes may occur; one, the lesions may be progressive and spread beyond the original point of invasion; second, due to progression, with caseation and liquification of the area, an erosion into a bronchus may develop; and third, the organisms may be carried by erosion through the wall of a blood vessel into the blood stream. The lymph nodes may caseate and liquify with resultant ulceration. The tuberculous material may be split into the bronchial tree with a further invasion of other pulmonary areas. A fourth and more remote danger may occur before calcification is established. It is the general infection which is the result of hematogenous and or bronchogenic spread. As a result of these processes, generalized or military tuberculosis develops. As the bacilli are swept in the blood stream throughout the entire system, multiple tubercle formation occurs in any or all tissues. It is always a complication of active primary tuberculosis and hence is more frequent in infancy. All organs of the body are invaded, as well as any serous membrane. However, in the primary infection, the lesions may be arrested at the level of the tracheo-bronchial lymph nodes. Retrogressive processes take place, with the deposition of calcium or fibrous residues which remain permanent. This arrest is dependent upon several factors such as resistance of the tissues and the degree of acquired immunity.

In adolescence and early adult life, reactivation of quiescent lesions occurs. These are the result of the pathology which is established at the time of the primary infection. Old apical lesions flare up to form a progressive ulcerative stage, or previously quiescent lymph nodes break down. The pathological changes in the gland results in ulceration and liberation of more tubercle bacilli into the blood stream or bronchii. Consequent further infections develop in new areas. The disease progresses by repeating, over and over, the same process which occurs in the primary lesion; that is, extension of the lesion from the new site of infection by progression, then as a result of central caseation, liquification, ulceration, to bronchogenic or hematogenous extension. Lesions may be of varying ages and stages of progression as a result of succeeding ulcerations into hematogenous and bronchial fields. The extent of the general systemic response with the appearance of toxic symptoms is dependent upon the number of tubercle bacilli which are thrown in the circulation at one time, together with the extent of liquification which has occurred.

At adolescence or in adult life, a completely new infection may occur due to the inhalation of tubercle bacilli after the primary infection is completely arrested and the above mentioned chain of pathologic procedures occurs.

The infection which develops in adolescences is an exudative process in contrast to the proliferative one which is typical of the primary infection. In adolescence, the infection tends to localize itself, to form cavities, and not to further invade the glands.

Repair is made in the adolescent and adult stages by fibrosis, in contrast to calcification in the primary infection. The lesions are usually apical in location in the older age group of cases while the infection of the primary lesions in infancy are commonly in the lower lobes.

It will be noted that the same process occurs both at the point of invasion through the epithelial surfaces and within the lymph glands. The tendency of the lesions in the primary complex is to heal. It is of paramount importance to keep this in mind in all pulmonary lesions in children.

As the tubercle forms, or as a lymph gland enlarges, it may obstruct a bronchus. This produces an atelectasis distal to the point of the obstruction. A plug of mucus may cause the development of the same condition. With the collapse of a portion of the lung distal to the obstruction, shifting of the mediastinal contents may occur.

Cavities in the parenchyma may develop in a primary lesion; or if a tuberculous pneumonia is present in an atelectatic area, a cavity may be formed as a result of the caseation and absorption.

6. Diagnosis

The approach to any diagnosis, and particularly, that of tuberculosis, still rests firmly upon the recognized basis of: thorough history taking, complete physical examination; adequate laboratory studies and Roentgenograms correctly interpreted and associated with the history and clinical findings. It is important to emphasize that the laboratory findings and X-ray reports are to be considered merely as supportive evidence of the two paramount basic steps; a good history and a complete physical examination.

It is always advisable to maintain a regular procedure in developing the history in order to miss no important point.

a. Get the chief complaint (C.C.). It is often a vague one but an effort should be made to discover that one which causes the patient the greatest annoyance. Remember, a patient does not know that the various symptoms are related to each other. The symptoms of which he complains at the time of the visit are the most outstanding in his mind. You must remember that his first symptoms may have been forgotten. It is the examiner's task to arrange these statements in their correct order.

(1) Tuberculosis should be considered as a possible cause in:-

(a) Any patient with vague symptoms, weight loss, malaise, easy fatigue, persistent cough.

(b) In any patient, especially a young one, with recurrent attacks of grippe.

(c) In any patient with a typical or unresolved pneumonia.

(d) In any patient with cough and expectoration lasting over six weeks.

(e) In any patient who spits blood.

(f) In any patient with pleurisy, especially with effusion.

(g) In any patient with unexplained fever.

(h) In any patient with mild or obscure lesions such as:

1. Persistent lymph adenopathy
2. Fistula in ano
3. Chronic laryngitis and hoarseness.

There is another approach to the diagnosis of tuberculosis.

(2) Tuberculosis case-finding in apparently healthy people.

There is

- (a) Routine X-ray examination of chest,
- (b) With or without previous tuberculin test.
- (c) Positive X-ray findings require as follows:

1. Complete history
2. Complete P. E.
3. Complete tuberculosis laboratory study.

(b) Get the history of the present illness (G.P.I.)
Remember, of what does the patient complain? This is the basis for the history of symptoms. Remember that the patient does not know the pathology of tuberculosis; you do. You know the point of primary focus and the routes of invasion along which the infection proceeds. It is your task to establish that point of primary focus if possible, and from there move into the history. Since 95% of tuberculosis is usually found in the respiratory system--and if the chief complaint leads into that system--one

begins the history with those questions which involve that system. Discovery of the date of onset of symptoms of tuberculosis is difficult because it is so atypical; but ask the question, "When did this symptom, the chief complaint, first appear?" Then make a thorough inquiry as to the presence or absence of the following points:

(1) Fatigue and lassitude.

They begin at what time of day? Does the patient awake rested and restored to energy?

(2) Is there noted any loss of staying power?

(3) Has there been any loss of weight or is the weight at a standstill? What was the last weight and when was the patient weighed?

(4) Does any rise in temperature occur? And at what time of day does it develop?

(5) Has the patient noted any nights sweats?

(6) Is there any chilliness?

(7) Does the patient complain of any chest pain or "pleurisy"?

(8) Is there any cough? Or even any clearing of the throat early in the morning? When does the cough occur? Does exertion increase the extent of the coughing? What is its duration?

(9) Is there any sputum? What are its characteristics? Thick or mucoid? Color? Increased amount at any time of day? Quantity in twenty-four hours?

(10) Has there been any hemorrhage or even any slight streaking of the sputum with blood? At what time of day does it occur? What is the color and quantity of blood lost?

(11) Is there any dyspnea on exertion?

(12) Is there any wheezing respirations or stridulous breathing?

(13) Has any hoarseness or aphonia developed?

(14) Has the patient's family noted any pallor?

(15) Is there any cardio-vascular instability?

(16) Has the patient noted any episodes of illness, repeated in character, like grippe?

Since sputum may be coughed up and swallowed, it follows that the G.I. system would become readily involved. Therefore,

a review of the symptomatology of that system would be the next line of inquiry with particular emphasis upon the following points:

- (17) Is there any capriciousness or loss of appetite?
- (18) Is there any nausea or vomiting, especially following severe coughing in the morning?
- (19) Are there any colicky pains throughout the abdomen?
- (20) Has there been any alteration in bowel function? Has there been any diarrhea alternating with constipation?

Recalling the close association between the respiratory and cardio-vascular systems, the following questions should be asked:

- (21) Has there been noted any cyanosis of the lips or nails?
- (22) Has there been any variability in the pulse rate?

Then since the spread of tuberculosis is also by the lymphohematogenous route, review the symptoms of the genito-urinary tract.

- (23) Is there any localized pain, tenderness or enlargement in the lumbar regions?
- (24) Is there any frequency of urination?
- (25) Is there any painful urination?
- (26) How long have these symptoms continued to be present?

And upon the same basis, inquiry into any symptoms involving the nervous system should be investigated--even though nervous and psychic reactions are usually absent--asking inquiry concerning:

- (27) Headache
- (28) Change in disposition.
- (29) Increased irritability.

c. Past medical history (P.M.H.). Since the foundation of chronic tuberculosis is laid in childhood, particular care should be taken in acquiring the past medical history (P.M.H.). In doing any check up program as in a mass case-finding campaign where there may be no history of any present illness, it is vitally important that the past medical history be thoroughly done. Remember, the death rate is high from tuberculosis in the first two years of life, and that in Japan, contact with the infection in the home is

intimate and constant. Inquire definitely concerning any and all of the following conditions which have an effect upon activating any quiescent lesions and list them in chronological order.

(1) Any bronchopneumonia in the first two years or a prolonged enteritis?

(2) Diphtheria? Was the child immunized against it? When? What dosages? And how many?

(3) Smallpox? Was there any vaccination?

(4) Measles?

(5) Pertussis? Any immunizations?

(6) Scarlet fever?

(7) Diarrhoeal diseases? Was there any immunizations?

(8) Chickenpox?

(9) Typhoid or Paratyphoid fever?

(10) Grippe or influenza?

(11) Pleurisy?

(12) Special inquiry should be made in Japan concerning the use of B.C.G. The date of the injection and the dose given should be accurately determined.

d. Menstrual history. If the patient is a woman; inquiry should be made as to the age of onset of menstruation, its regularity, its flow as to amount, color, freedom from clotting; the presence of pain and its time of occurrence in relation to the menstrual cycle. With a married woman, the history of her pregnancies and particularly if miscarriages have occurred is of vital importance. It is these women that so often have a pulmonary hemorrhage and reinfection following a delivery. And if she is an older woman, the age and character of her menopause.

e. The family history (F.H.). The family history (F.H.) is of great importance since family life in Japan is so intense. Patients are in very intimate contact with tuberculosis in their own homes. It must be recalled that the family may not, or may not be willing, to recognize the presence of tuberculosis in its midst. They may not know of it even if recognized by a physician. He may have diagnosed it as pleurisy to avoid offending the sensitivities and losing his case, or to assist in their intimate family affairs; such as the marriage of a daughter. Inquiry should be made concerning the tuberculous symptoms among members of the family, particularly concerning the loss of infants in the first two years of life. It is worth recalling that children under five years usually contract

tuberculosis within the home, and over five years, outside of it. Make inquiry concerning other chronic diseases in the family. For example, diabetes mellitus so often predisposes to activation of a quiescent tuberculous lesion.

At this point in the history inquire about conditions in their home or at their work, their mode of life, their social status and their dietetic regime in this present period of national recovery.

Any mixture of racial strains would be interesting from the standpoint of racial susceptibility to the disease. Any familial conditions which may be present would be included here, remembering that in Japan, tuberculosis is considered by many people as a hereditary condition.

It will be remembered that in the outline of a history as cited above, emphasis is laid throughout upon tuberculosis, while other equally important points leading to other diagnoses have not been stressed. However, it is not to be overlooked that other conditions may be of great importance since they are factors which reduce the patient's resistance and increase his susceptibility to tuberculosis.

Acting upon the suggestion of several of the younger medical officers of the Military Government teams, the following discussion of the symptoms was developed and so arranged that the numerical headings of both the questions in the history and discussion of those points were the same.

f. Keep in mind primarily the pathology and the various steps in its development. Study the order of appearance of the symptoms and associate them with the pathology.

(1)-(2) Fatigue, lassitude, loss of staying power may be the first symptom a patient notes. At first it is observed late in the afternoon, but gradually moves earlier and earlier in the day. Increasing the rest hours fails to help. These are the most common symptoms of toxemia.

(3) Weight loss is gradual. None is noted at first and some patients say they have gained a little early in the illness. It may be rapid in the acute fibrile stage. Fat is lost first, then muscle and finally atrophy of the skin occurs.

(4) Temperature. Its presence indicates a toxemia. It may not appear until a few months have passed. It may be subnormal or normal in the morning, but reaches its high point between 1600 and 2000. Its onset is insidious and dependent upon the extent of the pathology causing toxemia. There may be a wide swing if the patient develops an acute tuberculosis pneumonia, or in advanced cases, there may be morning rise instead of an afternoon one.

(5) Night sweats are not an early symptom. They are a constitutional one. They occur often only when the temperature is elevated or there is much exhaustion. Drenching prostrating sweats

are present with marked cavitation and suppurative processes.

(6) There is usually no chilliness except when there is an acute onset as in pulmonary tuberculosis pneumonia. This absence of chilliness is a diagnostic point of value from a pneumonia.

(7) Chest pain, spoken of as pleurisy, and it is so, because it is an indication of an inflamed pleura, so often it is the first symptom of tuberculosis. It also occurs as an early symptom in acute pulmonary tuberculosis pneumonia. There may be a sense of constriction of the chest rather than pain with each respiration. It varies markedly in character from slight to severe pain, from dull to stabbing, from acute to recurrent, and it is increased by respiratory effort. The pleurisy is usually close to the site of the lesion which is a diagnostic point. However, it may be referred to the shoulder or to the belly if it should be diaphragmatic in location. The acute pain does not persist but a sensitiveness may continue to be annoying. If the condition becomes chronic, a constant ache or soreness may continue in the side, aggravated by damp weather or fatigue and noted for many years after the lesion has become quiescent.

(8) The cough is the most common local symptom. However, it may not be a prominent symptom early in the process and does not appear until ulceration of the pulmonary lesion into the bronchi has occurred. However, it is more prominent in the early morning on awakening. It may be merely clearing of the throat. If the lesion should lie close to the pleura, a cough may appear which is completely unproductive due to reflex action. As ulceration develops, the cough becomes more and more productive and may be very annoying in the later stages, even interfering with eating and sleeping. A change occurs in its character with involvement of the larynx. It becomes painful and annoying and the sound assumes a stridulous character.

(9) A study of sputum helps in determination of the activity of the lesion. Early in the disease there may be but a little shiny mucus. Later, as progression occurs, the quantity and the frequency of expectoration increases, but may vary from time to time. There may be a few patches of muco-pus in the morning. Any abrupt onset indicates an ulceration into a bronchus of a pulmonary lesion. There may be a decrease by occlusion of a bronchus followed by a sudden release of a large quantity of sputum. The quantity may be 30 cc with an increase up to 90 cc. Advanced cases may have up to 350 cc daily. The sputum in the acute pulmonary pneumonia is purulent, greenish yellow in color. It is sticky, tenacious, and on standing does not separate in layers. However, as the condition improves the greenish color disappears and the consistency becomes much more like mucus.

(10) Hemorrhage. It is not an early sign. It is due to an ulcerated lesion into a bronchus or to weakening by ulceration of the walls of blood vessels in the wall of a cavity or even release of pressure upon the superficial vessel walls. About 50% of

cases show signs of hemorrhage. Many patients note a sense of congestion in the chest or complain of a bubbling sensation in the side effected before the hemorrhage occurs. The quantity is usually small though it depends on the size of the vessel which is ruptured. Copious bleeding is not rare and may amount to 60-360 cc. It may be merely a pinkness, a streaking or spotting of the morning sputum which is the most common time of its occurrence though it may occur at any time. Massive fatal hemorrhages, however, are rare. It may be associated with the occurrence of the menstrual cycle. The hemorrhage results in a pneumonitis of varying intensity and duration. It may be regressive or progressive, the latter associated with reinfection and so overwhelming that death may occur. Not only may it rupture into a bronchus, but into a pleural cavity, thus masking the extent of the hemorrhage.

(11) As to the occurrence of Dyspnoea, it is not an early symptom. There may be some slight increase of respiratory rate as a manifestation of toxemia in a febrile stage. It also indicates a rapid accumulation of fluid in a pleurisy.

(12) Wheezing and stridulous breathing are symptoms which appear late, usually when cavitation has occurred, or due to changes in the size and shape of the bronchi as the result of cicatricial contractions, secondary to ulcerations.

(13) Hoarseness always develops late as a rule because the laryngeal involvement is usually secondary to infections occurring primarily lower down in the respiratory tree. If it is a persistent symptom, it indicates involvement of the larynx itself and is associated with the complaints of dryness and tickling.

(14) The family or the patient himself may state that he seems quite pale. It is a condition which occurs late in the disease. So often it is associated with intestinal tuberculosis or amyloidosis.

(15) A tachycardia is noted in the midst of the disease. Earlier the rate is regular but after exercise, it fails to return as quickly to a normal level. The tension of the vessel is poor and the pulse is often associated with a low systolic figure in blood pressure. The poor vascular tone leads to clamminess and coldness of hands and feet, bluish nails and lips.

(16) There is one type of onset of tuberculosis which resembles gripe. There is mild muscle ache, together with other symptoms of this condition. The attack may last several weeks but tends to be recurrent. This may lead to an error in diagnosis.

(17) Gastro-intestinal symptoms are usually vague.

Variability of the appetite is a constitutional symptom. It indicates a toxemia. Vomiting is unusual but may occur after or during eating should the patient strain while coughing. Since the purulent material coughed up from the lungs

is swallowed, a mild inflammation of the gastric mucous membrane may develop.

(18) A severe coughing paroxysm, especially in the morning may cause vomiting.

(19) When colicky pains are late symptoms, they are associated with alternating diarrhea and constipation. Ulcerations in the bowel is strongly suggested.

(20) Ulceration in the bowel develops late. It is usually in the lower portion of the ileum. It is indicated by alteration in bowel function.

(21) Cyanosis of lips and nails varies in its appearance depending upon the type of onset. They are an indication of any acute congestion through the lung fields. It will be noted in an acute pulmonary tuberculosis.

(22) The pulse rate may remain elevated after the temperature has reached normal. It is an indication of the presence of activity.

(23) Remembering the pathology--that other organs are invaded by hematogenous route--it is necessary to inquire concerning genito urinary symptoms. They may be the first indication of any tuberculosis re-infection. Therefore, pain, tenderness and swelling in the lumbar space should lead one to consider tuberculosis as a possible diagnosis.

(24) The frequency of urination indicates, of course, an irritation of the bladder which is secondary to infection higher in the genito-urinary system.

(25) The same holds true for painful urination.

(26) The above symptoms are prolonged in tuberculosis beyond the usual time of recovery of a simple cystitis.

(27) Prolonged headache may be again the first indication of a hematogenous spread indicating a beginning meningitis. While it is a complication usually appearing in childhood, it can and does develop in the adolescence and adult period. Toxic psychosis are unusual.

(28)-(29) The same holds true concerning these points as of headache.

While menorrhoea is unusual, it does develop in tuberculosis. Menstruation may be delayed in a girl with tuberculosis and is often scanty and irregular in older women. While a tuberculous woman can become pregnant, fertility is somewhat impaired, and abortion does occur spontaneously in the more advanced stages. No alteration in libido or potentia colundi is found in the earlier or middle stages of the disease.

g. In this manual it is hardly more than necessary to list the differential diagnoses.

1. Bronchopneumonia
2. Lung Abscess
3. Bronchiectasis
4. Cancer of Lung
5. Emphysema and Pulmonary Fibrosis
6. Mycoses
7. Pulmonary Lesions secondary to cardiac disease
8. Suppuration in structures contiguous with the lungs.

7. Physical Examination

a. It is well to remember that physical signs are those which the examiner finds. They do not belong in the history. A planned procedure is absolutely necessary to avoid missing any signs of tuberculosis in structures other than the lungs.

The obvious points of a physical examination hardly need to be discussed; however, there are many points in conducting an examination which help much to complete the picture.

An old adage to remember is "Stop! Look! Listen!"

Stop, to record the findings while doing the examination.

Look, at the patient, and see at what you are looking.

Listen, to the sounds you hear in the patient (and what he says).

b. Good light, a quiet room, and a comfortable patient are paramount for a good physical examination. Physical examinations are being done in Japan without any attempt to obtain any of these necessary prerequisites. It is not necessary to uncover the patient completely, but it is necessary to arrange the clothing that every portion of the body is uncovered at some one time during the examination. Observation in clinics, hospitals and health centers in Japan has made it necessary to emphasize these points. In the examination of children, always leave any annoying or painful procedures to the last.

(1) Start at the top of the head and proceed downward. While the lung fields are of primary interest in most tubercular patients, there may be indications of its spread into every portion of the head and neck. Look for eye changes, variations in mucus membranes of nose, mouth and throat; variations in the skin texture and color. Observe the voice for changes. Inquire concerning any deafness. Learn to use a tongue depressor properly. Gagging is unnecessary. Put the depressor at the base of tonsil on the lateral aspect of the tongue and push the tongue obliquely forward. Check the lymphatic glands of the neck in both anterior and posterior groups.

(2) The familiar four steps of procedure of a physical examination of the lung fields will be observed. These, you recall, are:-Inspection, Palpation, Percussion, and Auscultation. Do not depend on memory; write down your findings at once.

Do the posterior aspect of the chest first. It avoids the immediate embarrassment which a patient feels, and more important, one does not fail to examine the posterior aspect of the chest. If they don't turn their backs, you don't examine a chest. The use of a diagram of the thorax helps immensely. "A picture is worth a thousand words" so say the Japanese. If there is no printed form, the following suggestions are helpful. (See addenda).

Chest examination -

Place the patient if he is ambulatory with his back to the light, or if a bed patient, the foot of the bed toward the light, and note the following points:-

(a) Inspection -

1. The alignment of the spine.
2. The alignment of the shoulders.
3. The movement of the scapulae. Do they move in unison or is there a lag upon one side with deep inspiration?
4. Are the interspaces equal bilaterally?
5. Are there any retractions of the interspaces?

(b) Palpation -

Place the thumbs together with the fingers spread over the thorax, at the 10th thoracic vertebra. Have the patient take a deep breath and check the basal movements for equality of expansion.

Tactile Fremitus. Many examiners exert too much pressure. Use merely the tips of the fingers or the lateral aspect of the hand and keep the touch extremely light. Don't press, touch.

(c) Percussion -

Use a skin pencil or marker. Keep the percussion light. The hand is not a hammer. Strike the blow with one finger. Work in a quiet room so that the sound of percussion is the outstanding sound. Compare both sides as percussion is done. Remember one can feel a difference in tension of the underlying tissues. At both bases, percuss in the 9th interspace as the diaphragm moves downward with deep inspiration to check diaphragmatic movement.

d. Auscultation -

Have a quiet room and listen! Conduct the auscultation in a regular fashion proceeding from above downward, and compare both sides, observing vocal resonance, whispering pectoriloquy and breath sounds. It is advisable to make notes as one finishes each phase of the examination.

(3). Then, turn the patient to face the examiner. Do the cardiac examination first, and make the necessary records. The same principles of inspection, palpation, percussion and auscultation should be followed in regular order. Again carry out the same technique of examination of the lung fields anteriorly as had been followed posteriorly. And again make notes of each stage of the procedure. Follow the same procedures while doing a cardiac examination.

(4) The abdominal examination. The patient should lie down on a covered table. If the examiner's hands are warm (and clean), muscle spasm is less likely to interfere with deep palpation. The patient can be taught to drop the jaw and breathe through the mouth with very shallow respirations, thus avoid abdominal splinting. There is no difference in which quadrant the examination is begun so long as a regular routine is observed. Recall the pathology of abdominal tuberculosis with the resultant peritonitis in its various types and stages. Remember the patient complains of pain; you find tenderness.

(5) Then check the genitalia and anal regions. A painful hemorrhoid may be an early fistula in ano, or a painful testes an early tuberculous epididymitis.

(6) Any change in the reflexes, sensitivity of skin or cornea; any paralysis or any other neurological symptom may indicate an early tuberculosis meningitis.

(7) Recalling that by hematogenous spreads any portion of the osseous system may be also involved, a slight blow on the top of the head with the patient in a sitting position jars the spine. This may localize a point of pain within the vertebral column. There may be tenderness or palpation; or pressure over the skeleton or there may be a change in posture or gait.

(a) The discovery of an apical lesion usually occurs in adults, but it may occur in the age group from 7 to 14 years. Cavitation may occur early even in the primary lesion or if caseous material is carried by bronchogenic spread, it may develop in the early years as well as in the adolescent or adult period.

Plan for diagram of the thorax.
Draw a bracket.
This represents the clavicles.



Draw a perpendicular line
from the center of the bracket
to represent the sternum.



Remember the 1st ribs join
the clavicle and sternum to
draw the half circles.

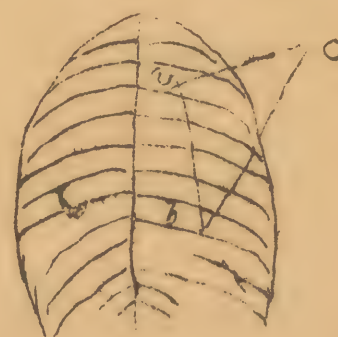
Remember the next 5 ribs
all meet the sternum, so
continue downward.
The nipple lies in the
4th interspace in
mid clavicular line.



Posteriorly, the diagram is
drawn as follows: Draw
a perpendicular line.
Draw two curved lines to
represent the thoracic wall.



Ten ribs extend from spine line
to the thoracic wall line.
The upper inner angle of the
scapula is in the 3rd inter-
space in the mid thoracic line.
(a) The lower angle of the
scapula in the 8th interspace.
(b) The acromiion process of the
scapula is distal to the 2nd inter-
space. (c).



Plan for diagram.

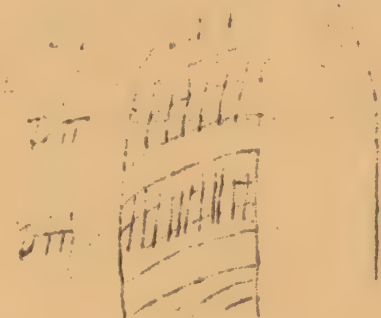
By filling in the interspaces with various densities, the extent of dullness or percussion can be indicated.

||||| ||||| |||
D D D

Pleural rub is indicated by

Crepitant Rales by

Coarse Rales by



8 Laboratory Studies

The sedimentation rate of the red blood cells is increased as long as there is a progression of the tuberculosis lesion associated with fever, regardless of the phase of the disease. There also occurs an increased sedimentation rate in pregnancy after the third to fourth month, in cancer corresponding with the degree of malignancy, and in localized infections which show an increase in leukocytic count.

In the early stages of tuberculosis, there is no change in the blood picture; but as the later stages develop, a hypochromic anemia appears. In a tuberculous pneumonia, a leucocytosis up to 15,000 develops with an increase in the polymorphonuclear and mononuclear cells with a decrease in the lymphocytes, but in the usual tuberculous infection, the total count will alter but little. It shows an increase in the lymphocytic and monocyte cells with decrease of the polymorphonuclear cells.

a. Sputum

The finding of tubercle bacilli establishes a positive diagnosis. These appear in the sputum alone or intermixed with hemorrhage, in the spinal fluid, in the discharges from eroded lymph nodes or osseous sinuses, in the pleural fluid, or in the urine. It is difficult to obtain a satisfactory specimen of sputum unless the patient is adequately trained. The sputum must be actually coughed up from the trachea when the bronchial tree is first cleared in the morning. In children and infants, gastric washing must be done before gastric peristalsis has begun, early in the morning.

b. The Tuberculin Reaction

A study was done at the Bellevue Hospital in New York City covering a period of five years (from 1930 to 1936) on 11,000 children. Their ages included the period from birth to 12 years. This study showed a steady increase in the rate of positive tuberculin reactions with each increasing year of age.

The tuberculin reaction is based upon an allergic response of

the tissues to the presence of the tubercle bacilli. The Mantoux, which is an intracutaneous test, is preferred in the United States, and is the one which is commonly done in Japan. Old tuberculin is used. In the first test, 0.1 cc of 1 to 10,000 or 1 to 1,000 dilution is used, and 0.1 of a 1 to 100 dilution in the second test. The reaction is read in 48 hours. A positive reaction is an elevated, reddened, indurated area, at least 0.5 cm in diameter, or there may be several papules appear at the site of the injection. A pseudo reaction appears as a reddened area without elevation. There is also a generalized systemic reaction. About any existing tuberculous lesion, a localized reaction may occur and the activity of that lesion may be increased by the tuberculin reaction. One may have false positive reactions, which are most marked in the first 24 hours, due to too large doses of tuberculin.

A positive test indicates that an individual has been infected with tuberculosis and is sensitive to its proteins. It does not indicate the presence or the extent of an activity.

A negative reaction indicates a possibility that there has been no tuberculous infection. However, the reaction may be negative because; first, it may be too early in the period of invasion; second, in the terminal stages of the disease; third, if there is a marked dehydration or severe wasting or severe febrile stage; four, the existence of a tuberculous lesion which is thoroughly calcified and healed; five, the dose of tuberculin being too small.

There are other laboratory studies of interest but not of diagnostic importance.

9. Roentgenographic Diagnosis

The greatest value of roentgenographic studies lies in the ability to observe the progress of the pulmonary lesions. To review the roentgenograms of pulmonary lesions in the various age groups, the appearance of the primary lesion shall be briefly considered first. Recalling the pathological changes as formerly described, one must remember that the primary lesion is usually small; less than 3 mm. in diameter and may be too small to show upon the X-ray film, or it may not be calcified at all. The primary lesion lies usually in the periphery of the lower lobes though it may develop anywhere in the lung fields. However, there may be an extensive involvement of much of a lobe, and the density upon the film may vary. When this lesion is healed, the X-ray findings may show merely bands of fibrous tissue through the lung field and calcified area, the Ghon's tubercle. It must also be recalled that the pathology indicates a spread from the primary lesion to the trachio-bronchial lymph nodes. It may require lateral or oblique films to show these nodes which have become enlarged.

If the primary lesion is not demonstrable, due to its small size or lack of calcification, the hilar nodes may show no

calcification. The primary lesion may be demonstrable, but the lesion be too early for calcification in the lymph nodes to occur. But if the Ghon's tubercle, the calcified primary lesion, is seen, calcification in the lymph nodes is usually found also. This is the primary complex of the disease.

Should a lesion be seen in the parenchyma of the lungs and no involvement of the lymph nodes be found, the lesion is probably tuberculous. A positive tuberculin reaction increases the possibility of the lesion being tuberculous.

The primary lesion may produce a wide-spread reaction in a lung, but no calcification in the lymph nodes may be seen. A bronchus may be obstructed by a tubercle or by an enlarged lymph node. An atelectasis distal to the point of obstruction may result and other thoracic structures may be seen to be displaced. Yet, the hilar nodes may or may not show any calcification. The density of an atelectasis is the same throughout the involved area.

With a miliary tuberculosis, with or without a demonstrable primary lesion, the hilar nodes show no calcification because the condition develops too swiftly. With a caseous bronchopneumonia, the nodes show calcification since the progress of the lesion is developed more slowly. The disposition of this lesion is over a wide area, often involving the entire area of the lung.

The contour of calcified lesions are more irregular. Because of the irregular deposition of the calcium in them, they vary in their density. Coccidiodomycosis and histoplasmosis also cause calcification in the lung fields.

As to enlargement of the lymph glands, Hodgkin's Disease or lymphoblastoma may be the cause. If the tuberculin reaction is also positive, a biopsy is required to clear the diagnosis.

The great advantage of roentgen studies is that serial studies of the lung fields in pulmonary tuberculosis can be conducted over a period of months. If there is but little change in the appearance, tuberculosis is apt to be the cause. In a low grade bronchopneumonia, however, a serial study will show definite change from time to time.

It is worth noting that laboratory findings are combined with the roentgenographic studies in arriving at a diagnosis.

10 Treatment

The treatment of tuberculosis requires the "long look ahead". It is not the immediate condition which is alone important, but it is the potential dangers which must not be forgotten. Planning for that treatment is based upon a thorough knowledge of the underlying pathology. The patient's physical condition is of primary importance, but the social, economic and personal phases must also be kept in mind.

a. After a case study is complete, the first question which arises is "Does the patient require treatment?" There is a group of these patients who do not. These are the patients in whose X-ray studies, calcification of the primary complex is seen, but they have had no signs of activity for years. There is a second group whose X-ray studies show old fibrotic changes at the apices but who are perfectly well. There is a third group whose X-ray findings show the scars in the lung fields of former infections. With extra pulmonary lesions as well; but both areas are completely healed. However, the opinion of complete healing must be a guarded one, since the center of the calcified mass may still be composed of caseous material in which virulent bacilli may be found. A yearly check-up of these cases is advisable.

In Japan as well as in the United States, there are two groups which may be considered border-line groups; (a) those over 20 and those under 20. (In the United States over or under 25 years). In the first group, the X-ray may show changes from one examination to another. There may be individuals who have a slight fever, malaise, easy fatigue or weight loss whose lesions are apparently calcified. The fibrosis about the lesion may or may not have thoroughly encapsulated the infection in this older age group. Whether or not this group requires treatment depends upon their laboratory and X-ray findings. A check once a month for several months, gathers evidence upon which to plan their treatment. Any patient should be treated whose X-ray film shows lack of calcification (a poorly outlined soft shadow) in its outline because the lesion is unstable and always potentially dangerous.

In the second group, those under 20 years, the X-ray findings alone are enough to decide upon treatment. These studies should be done at two week intervals. Any instability of the lesions demands bed rest and, in the younger individual, stricter study. The older group of patients can be kept at work and follow a daily routine. Records should be kept of the temperature, pulse and respiration every fourth hour, and the laboratory work done every one to three weeks. Any instability, either progressive or regressive, means treatment. If it is found in a youth or a young adult, it is a definite indication that study and treatment should be done in bed, even if there are no symptoms. These require very careful laboratory studies for the presence of tubercle bacilli, and negative findings do not--do not--mean that treatment is not required. The laboratory work is observed in many places throughout Tokyo area is not thorough enough to rule out the presence of the tubercle bacilli in the sputum.

There is a group who definitely should be under treatment. These show the five important clinical symptoms and signs, - fever, malnutrition, fatigue, cough and hemoptoe. These constitute all patients of whatever age group with clinical symptoms of activity, patients with new lesions, or whose lesions have not yet been stabilized, and patients whose lesions have been reactivated. This classification is based upon that of Dr. J. Barnes A. Henson.

In the treatment of the primary lesion, remember many of these patients show no symptoms at all in relation to the lung fields. However, it is in this age group that one must continually recall the rapidity of spread through the hematogenous route with the appearance of symptoms and signs in other systems--gastro-intestinal, nervous, osseous, renal--unrelated directly to the lung fields. Do not fail to recall the most important cause of meningitis in the first three years of life is tuberculosis, nor that gastro-intestinal symptoms may be tuberculous in origin. Keep in mind the close family relationship in the young individual in the presence of infection. All active or potentially active cases who have a chance to recover should be kept in bed. A delay of a week or months in beginning treatment means loss of irrecoverable ground. Begin treatment as soon as the lesion is discovered. Rather treat a quiescent lesion until it is proved otherwise than lose a patient. Don't wait for a cavity and the potential hemorrhage from its walls. Avoid the cavity formation if possible by insisting on complete rest. The same situation exists in young adolescents who have a reinfection superimposed upon a healed primary lesion, or an activation of a primary lesion which was previously arrested. Remember the "long look ahead" which the pathology demands--the look to see possible caseation, liquefaction, erosion, hemorrhage and further spread.

Tuberculosis is a disease with which a patient must learn to live. He must realize that recovery is a slow process and that it will take time. While it is a difficult task to explain the healing of tuberculosis simply, it can and must be done and the patients must understand it. He must accept the diagnosis and make the necessary adjustments in his work and habits of life. He must understand his symptoms and know what to do when and as they appear. He must realize that delay of treatment for weeks or months means danger, and the earlier the lesion and younger the patient, the greater is the necessity that treatment be instituted at once. The treatment must be planned according to the stage of the tuberculosis and the condition of the patient.

When an adult patient has a chronic tuberculosis, immediate treatment may be often postponed, and the hopeless and elderly patients with long standing lesions may have more delay than a young and active patient.

b. There is still but one chief principle in the treatment of tuberculosis and that is rest. And one must understand why rest is so important from a pathologic angle. Rest decreases the action of the lungs and aids in healing of the lesion. Rest decreases respiratory rate and amplitude. Rest decreases the circulatory rate and amount of blood passing through the lungs. Rest decreases toxemia. Rest reduces the amount of infected air inhaled into health lung areas. Rest maintains a good circulatory tone thus the danger of hemorrhages through increased permeability of

capillaries and friability of vessels. Rest maintains a good intestinal tone with adequate absorption. And rest is rest in bed, day and night, not one step to be permitted, avoiding restlessness or unnecessary movement; and local rest of the thorax may be obtained by splinting the affected side either by physical means or surgical intervention. Rest must also be mental as well as physical. A man or woman can scarcely rest when he must lie in bed and worry about his family's food or lodging.

The duration of the bed rest is based on the X-ray studies and bacteriological examination. Its duration is from two to twelve months. To get up too early means relapse.

A systematic check-up should be established to include the following guides:

(1) A collection of a twenty-four specimen of sputum twice a week to determine the quantity, and check for tubercle bacilli.

(2) X-ray studies from once a week to once a month for six months.

(3) Leucocyte count and sedimentation rate every second week.

(4) Weight is to be taken every second week unless the patient is too ill.

(5) Temperature, taken rectally, every second hour, day and night until the high point is determined; then every fourth hour.

(6) Pulse record should be made every fourth hour because its instability is an indication of toxemia long after the temperature becomes stable.

(7) Record the appearance, general condition, reaction to fatigue, eliminative functions and any appearance of the symptoms and signs already discussed.

Prolongation of the rest period of treatment until the lesion is securely walled off within a fibrotic capsule is definitely better than permitting the lesions to progress to the requirement of pneumothorax or potential hemorrhage. Activity must be assumed very gradually, only after the check-up indicates that stability has been reached. One should begin with fifteen minutes a day out of bed on a chair for two weeks; and then gradually increasing the time and the extent of activity.

c. The dietetic goal toward which Japan must work in the feeding of her adult tuberculosis patients is a 2000 calorie diet with protein of 65 gm.

Recommended Daily Allowances for Specific Food Nutrients for Tuberculosis Patients

Calories	2,000	
Protein	65	g.
Calcium	0.65	g.
Iron	12.0	mg.
Vitamin A	5,000	International Units
Thiamine	1.5	mg.
Riboflavin	2.2	mg.
Niacin	15.0	mg.
Ascorbic acid	100 to 125	mg.

While it is at present impossible to supply the Japanese with the above diet, one should know what is acceptable for this condition. Sun baths and helio therapy are contraindicated in pulmonary tuberculosis. However, they have their place in tuberculosis of bones and joints and the Rollier sun treatment and air baths can be given with excellent healing and tonic effects in this type of tuberculosis.

a. Drugs find their best use in their control symptoms. Expectorants do not help and disturb the appetite and interfere with nutrition. It is well known that in Japan, certain drugs are considered to be specific in the treatment of tuberculosis but opinions of their value varies markedly among the Japanese physicians. Streptomycin is being studied for its effect in the United States as well as Promin and Diazone, which are sulfa compounds, but reports are incomplete.

e. There is always the important question, when is the tubercular process arrested? The National Tuberculosis Association in America has established the following criteria. "The process is arrested when, for at least six months, the lesions have remained apparently healed, no tubercle bacilli have been demonstrable, and the patient has been symptom free under conditions of moderate physical activity". These patients should be checked once a month for four months, then every three to six months for two years, and then once a year, and then gradually resume his occupation. This regime covers a period of two years, and if he remains "arrested" for that period, the occurrence of relapse is greatly minimized.

f. Rest alone may be ineffective in the patient with cavitation. Collapse therapy is a distinct aid in these cases. With the collapse of the lung, the wall of the cavity is brought in contact with the other; the respiratory movement of the lung is limited and the rate of flow of the blood and lymph through the infected area is decreased. Pleural adhesions may interfere with adequate collapse. This therapy is of the greatest advantage in a chest in which there is cavitation in one lung with no adhesions and with little or no activity on the opposite side. With hemorrhage from the wall of a cavity, collapse therapy will help control it. And even in far advanced cases, it can be used to advantage for the same purpose.

It is necessary here only to mention that pneumoperitoneum, paralysis of the hemidiaphragm and thoracoplasty have been done to put the lung field at rest.

g. Children and adolescents should be hospitalized because they require close study and control to maintain their rest treatment. They can receive the proper training in self-care in association with other companions facing the same problem. They profit by the object lessons about them when patients have failed to maintain their rest treatment. They are happier among their own age groups and their education can be continued as a group.

The moderately advanced or cases with cavities should be hospitalized because of the danger of complications.

The far advanced elderly patient could remain at home for his own comfort as long as he is not a source of infection to the family or too great a drain upon the family economy.

n. Climate itself is not nearly as important as it was formerly considered to be. With the present crisis in Japan, it is almost impossible to transport patients to climates said to be suitable for their particular cases. One makes the effort to keep them as comfortable as possible in the locality in which they are living.

1. The cough usually responds to rest. It may require codeine 0.015 every four hours to control it at the beginning, and perhaps even a hypnotic at night. Steam inhalations are of use, and a hot drink in the morning is helpful. Postural drainage will clear the bronchial tree. Patients can be trained to control the cough and to avoid straining.

j. With the onset of hemorrhage there should be absolute rest in bed, lying upon the affected side. The hemorrhage decreases over a period of several days. Reassurance means much to the patient and codeine decreases the irritation from the cough.

11. Mass Examinations

a. In Japan, entire schools are given mass examinations in the health centers. The children are brought by their teachers, they are arranged in order according to a list, stripped to the waist, and X-ray films are taken on 35 mm. film. These films are developed, read, and any suspicious cases of tuberculosis are further studied by doing a sedimentation rate and a Mantoux test. Should the laboratory studies increase the suspicion of tuberculosis, the patient is followed in the clinic and in his own home.

b. Based upon these case findings, the public health nurses from that clinic in which the examination is done, should make repeated home visits. At her first one, she should discuss the contagiousness of the disease. She must begin to fight the fatalism and superstition with which Japan has accepted this disease. She must insist that every member of that household report to the health center for examination. She should explain that the Government is prepared to carry out these examinations free of charge if the family is unable to pay for them. (It has come to the attention of the Public Health and Welfare Section of SCAP that because of a patient's inability to pay, these individuals are ignored or neglected in the health centers. Their visits are repeatedly postponed and cursorily done. Necessary supervisory action will be taken to correct this practice.) The nurse should be able to instruct the family concerning home care of the patient until such time as he can be hospitalized. She must also instruct them on how to protect the members from the tuberculous infection during this period of pre-hospitalization. She must instruct the patient so that he (or she) realizes that he is the source of infection. He must be helped to see how he can check its spread in the family. He must assume that responsibility. He must realize that the greatest sign of affection he can express toward the family is by refraining from intimate contact. The nurse should advise the family to follow certain simple rules for the protection and care of its members.

(1) The patient should be trained to cover his face every time he coughs and sneezes with a paper tissue or cloth.

(2) He should be taught to collect all sputum in paper or cloth which can be burned after it is placed in a paper bag. These paper bags can be made from newspapers and folded according to the diagram at the end of this section. The nurse should know how to fold such a bag. If paper is not available, two covered cups can be used. When a cup becomes filled, the cup and its contents can be dropped into a pail containing 5% Lysol solution (25 cc of Lysol to 500 cc of water) and soaked for four hours and then washed out with warm water and thoroughly rinsed. The Lysol can be obtained through the prefectural office.

(3) The patient should have his own cup, bowl, plate and chop sticks. His food should be served to him in his individual dishes, and under no circumstances should he eat from the common dish with his own chop sticks or drink from a common cup. The patient's dishes and utensils should be washed separately from those of the family with soap and hot water.

(4) The patient should have his own individual clothes, towels, toilet articles, tooth brush and toys and sources of amusement. These must be kept separate from the family articles. He should be trained to acquire a possessiveness for these articles as a matter of protection for the rest of the family.

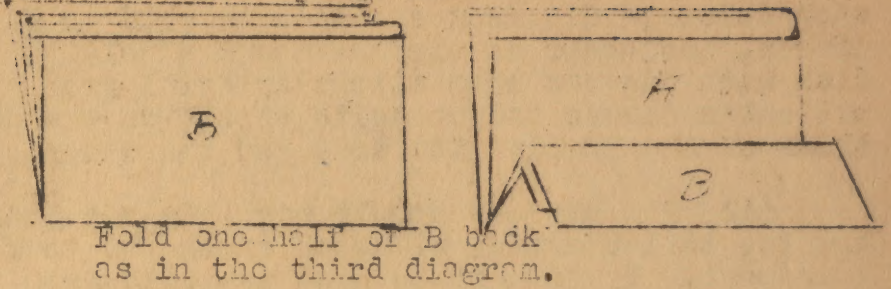
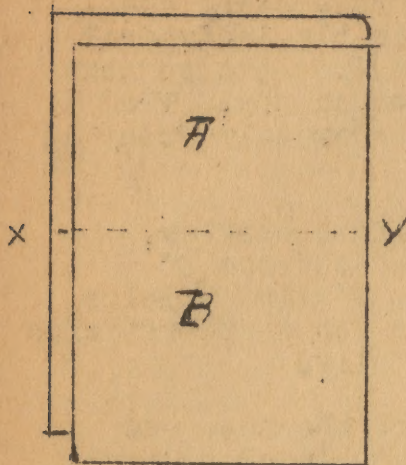
(5) Because the hands are constantly before the face and soiled with saliva, the patient should be trained always to wash his hands before eating and after coughing and sneezing.

(6) The patient should have his own room if possible. At least he should have his own bed and the bed covering should be so designed that they can be removed, soaked in 5% Lysol solution and washed at least twice a week. They should not be shared with any other member of the family. A suspended curtain across a portion of the room may give him at least separate space and act as a reminder to the family that special care is required. His room should be sunny if possible. Moist cleaning of the room should always be done so that the dust infected with tubercle bacilli is not carried throughout the house.

(7) Especially must both patient and the older members of the family be trained to protect infants, children and the adolescents from intimate contact with the patient.

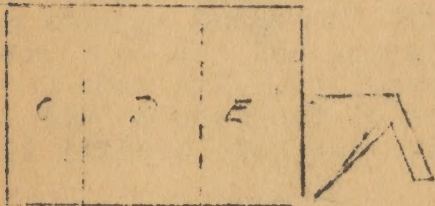
It must be kept in mind that home treatment is far from ideal and that hospitalization should be insisted on as quickly as transportation to the hospital can be obtained. Home care is merely an emergency measure and should be considered so at all times. It is through segregation of the tuberculosis patient in a hospital adequately equipped to care for the patient lies the hope of control of tuberculosis in Japan.

PREPARATION OF PAPER CUPS

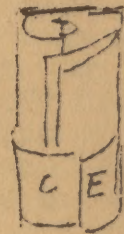
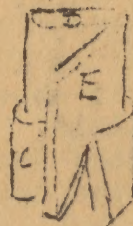


Fold one half of B back as in the third diagram.

Note that the folded edge of the newspaper is toward the right. Fold at x to y, B over A.



Note that the paper is turned so that the back of part A shows. Fold along the dotted lines to form C, D and E.



Note that E is tucked into C. Open to form the cup or bag.

A second such cup can be constructed and used as a cover.